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SECURITY AND POLITICAL INSTABILITY: A NEXUS BETWEEN FOOD, WATER, HEALTH AND CLIMATE CHANGE?

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Abstract

This article seeks to analyze the relationship between political instability, security and climate change. In it, we seek to identify climatic and political, social and economic factors that contribute to scrutinize situations of political and social instability. In light of this analysis, we come to the conclusion that climate change is not in itself a source of conflict, but instead rather relates to pre-existing factors of instability, and may thus lead to armed conflicts in terms of a multi-causal logic. This study adopts a qualitative, multi-disciplinary approach, combining theoretical analysis and case studies, bent on examining the intersection of climate change, security, and instability. It draws on secondary data sources, including academic literature, policy reports, and international security assessments, to identify patterns of environmental stress and their socio-political consequences. This approach offers us a comprehensive understanding of the multi-layered relationship between climate change and political instability..

Keywords

Climate change, Food security, Political instability, Security, Water resources.

Resumo

Este artigo procura analisar a relação entre instabilidade política, segurança e alterações climáticas. Para isso, procurámos identificar fatores climáticos, políticos, sociais e económicos que contribuem para o desencadear de situações de instabilidade política e social. À luz dessa análise, concluímos que as alterações climáticas não são, por si só, fontes diretas de conflito, estando relacionadas com fatores de instabilidade pré-existentes, podendo, assim, levar à ocorrência de conflitos armados numa lógica multicausal. O presente estudo adota uma abordagem qualitativa e multidisciplinar, combinando uma abordagem teórica com estudos de caso, no intuito de examinar as possíveis relações entre alterações climáticas, segurança e instabilidade. O estudo recorre a fontes de dados secundárias, incluindo literatura académica, relatórios de instituições políticas e relatórios internacionais de segurança, para a identificação de padrões de stress ambiental e das suas consequências sociopolíticas. Essa abordagem permite uma compreensão abrangente das relações multinível entre as alterações climáticas e instabilidade política.

Palavras-chave

Alterações climáticas, Instabilidade política, Recursos hídricos, Segurança, Segurança alimentar.

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1. Introduction

When we talk about security, we often talk about a sense of freedom from physical and psychological threats and freedom from necessity. These two dimensions ingather two fundamental pillars of human security, freedom from fear and freedom from want. However, security has historically been interpreted as the protection of the state and its interests, which is an eminently realist narrative that, despite competing in the academic domain with liberalism, was a dominant view until the 1990s.

The end of the Cold War and the emergence of a post-bipolar International System has facilitated the transformation of the way we look at security, so that it integrates both so-called traditional threats and non-traditional or unconventional threats that tend to focus on the individual (figure 1).

Traditionally, security as the security of the state is oriented towards preserving its territorial integrity and maintaining its political sovereignty (Attinà, 2016). The same author goes on to say that

> *"means, which are also important in defining traditional security, consist of weapons, armaments systems, and the military, but diplomatic means like pacts and alliances aimed at building special relations between states for security purposes are also means of traditional security"* (Attinà, 2016,p.175).

As we have seen, the traditional security agenda contrasts with the non-conventional security agenda, which tends to focus on the individual and includes issues such as energy security, food security and environmental security, among others.

The traditional agenda itself is also malleable, not only because many of these non-conventional threats have the potential to affect the territorial integrity of the state, for example through rising sea levels, but also because the agenda itself is subject to scientific and technological developments, the evolution of ideas and the changing dynamics of the international system.

But why do we focus on environmental issues? Environmental issues really began to appear on the international agenda in the mid-1960s and early 1970s.[1] However, it wasn't until the end of the Cold War that there was a qualitative leap in environmental issues on the international agenda in the late 1980s and early 1990s. As we have mentioned, this is a journey that began in the 1960s and, as such, it is justified to look at four phenomena of political and social transformation that occurred from that period onwards (Simões, 2024a).

The first of these phenomena concerns the development of social awareness of climate and environmental issues in developed countries. The development of this awareness is accompanied and promoted firstly by the dissemination of the work of figures such as Rachel Carson, David Suziki, Jacques Cousteau and David Attenborough. Secondly, by the proliferation of non-governmental organizations focused on environmental issues, such as the World Life Fund, Friends of Earth and Greenpeace. And thirdly, by the proliferation of international summits on environmental issues, such as the Stockholm Conference in 1972 (Barnett, 2010; Simões, 2024a).

The second phenomenon, which began arising in the 1970s, concerns the increase in the number of academics adopting a critical stance on orthodox security postures, which were incapable of responding to environmental challenges. The third phenomenon, the climate of "thaw" associated with the end of the Cold War, made it possible to open up international agendas to debate new security issues. Thus, at the end of the 20th century and the beginning of the 21st century, environmental, food and energy issues gained a prominent role in the security debate (Simões, 2024a).

Finally, the fourth phenomenon concerns the centrality of a greater global awareness of the impacts of climate change, not only on ecosystems, but also on human well-being and security. As a result, there should be also a wider awareness of the risks of a lack of access to food, drinking water, fertile soil, and the political instability that can result from this (Simões, 2024a).

In this article we seek to analyze the relationships between environmental insecurity, particularly in terms of its manifestation through food, water and health insecurity, and political instability. Given this end, from a methodological standpoint, we used concrete examples to better operationalize the theoretical component in study. Furthermore, in the context of methodology, we resorted to a bibliographical and documental analysis in order to operationalize our study.

The article is divided into four parts. The first part identifies and analyzes different perspectives on environmental security, which vary from the referent object to the level

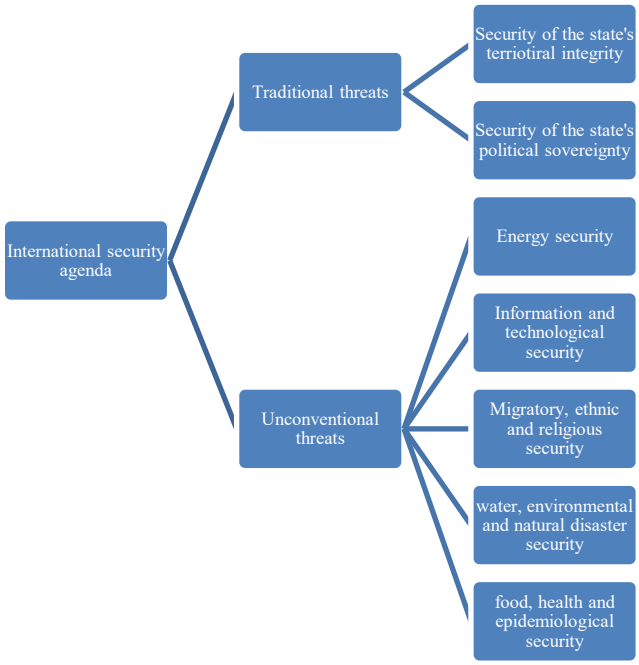
[1] There is a diverse set of factors that contribute to explaining why, from the mid-1960s and early 1970s, environmental issues have been gaining additional importance on the international agenda. These factors range from the political and economic to the social levels (Gomes, 2018; Gomes & Leong, 2023; Simões, 2024a), namely with changes in social awareness of the importance of the environment and the state of global environmental degradation, the dissemination of the scientific work of personalities such as David Attenborough, Jacques Cousteau, Rachel Carson, and David Suziki, the establishment and proliferation of environmentalist social movements and environmental organizations such as Green Peace, the World Life Fund and Friends of Earth, the proliferation of international summits on the environment and reports on the state of the environment, such as the "Our Common Future" report, as well as other factors such as the impact of the oil shocks, the greater number of academics with a critical stance on environmental issues and the end of the Cold War.

of analysis. The second part discusses the relationship between conflict dynamics and climate change. The third part analyzes the different traditional and unconventional threats associated with environmental security, so that along with territorial integrity, resource security, food security, health security and the security of migratory flows are analyzed. Finally, the fourth part looks at the security of water resources, looking in particular at the regional importance of the Tibetan Plateau.

2. Climate change and security

We have already discussed, in the introduction, the traditional perspective of security and its transition to a focus on human security, which enables both conventional and non-conventional threats to be integrated into the concept of security (figure 1), so now we will look at the idea of environmental security.

Figure 1 - Examples of traditional and unconventional security threats



Source: Own production

Let us start by defining what climate change is. Swain (2016, p.151) defines climate change as "*significant variations in the relevant climatic variables, namely temperature, precipitation and wind, over a certain period of time, usually more than 30 years*". In addition, climate change can lead to other consequences, such as rising sea levels, increased frequency and intensity of floods and droughts, and soil erosion, affecting other sectors such as agriculture, food and health (Simões, 2024a; Swain, 2016).

It can have both natural and anthropogenic causes, with one of the main causes being human emissions of greenhouse gases into the atmosphere. According to Schelling

(2000), the greenhouse effect is the result of a global collective good "*since the atmosphere is owned by no one, no one has sufficient incentive to control the changes caused by carbon emissions. Moreover, the carbon emitted has the same effect regardless of where on Earth it occurs*" (p.506 apud Simões, 2024a, p. 47).

Bartnett (2010), identifies six distinct approaches to environmental security (figure 2): (i) ecological security; (ii) common security; (iii) environmental violence; (iv) national security; (v) greening defence; (vi) human security.

Figure 2 – Approaches to environmental security

Name	Entity to be secured	Major source of risk	Scale of concern
Ecological security	Natural environment	Human activity	Ecosystems
Common security	Nation state	Environmental change	Global/regional
Environmental violence	Nation state	War	National
National security	Nation state	Environmental change	National
Greening defence	Armed forces	Green/peace groups	Organizational
Human security	Individuals	Environmental change	Local

Source: Barnett (2010)

Our first approach concerns "*the effects of human behavior on the environment. In this context, the referent object is the environment in its relationship with its ecological processes, while man is seen as the main threat and is only safe insofar as he integrates the environment*" (Simões, 2024a, p.52). Given the impact of human activity on the environment, the idea of ecological security may then be extended to an idea of Anthropocene security (Dalby, 2009).

The second approach, common security, concerns the security of the so-called global commons.[2] In this sense, Simões (2024a, p.52) states that "*environmental problems*

[2] Common goods derive "*from the interests of each individual placed in common with the aim of finding a collective solution or realization through the action of the group*" (Santos, 2001, p.95), but these objectives can be countered by the individual's particular goals. Historically, the term common good is associated with the existence of common pastures that would be exploited communally by the residents of a village or town, and which obeyed certain rules of use and access in order to mitigate the overexploitation of pastoral resources, for example (Lopes, 2018). It was only in 1968, with the publication of Garret Hardin's "The Tragedy of the Commons", that the concept came to be interpreted as "*a piece of land with free access, as if there were no defined ownership or established rules of use*" (Lopes, 2018, p.327-328). The concept became even more abstract and comprehensive when it began to identify what could be classified as a common good, especially considering that in some cases, the good or property could not always be clearly defined, as is the case with air, or cases where access rules are not only scarce or non-existent, but are difficult to monitor, as in the case of the oceans, or cases where the overexploitation of a given good is a global problem, but with different intensities at different latitudes, as is the case with water (Lopes, 2018). In addition, these goods have a number of fundamental characteristics, including their global physical nature, their competitive use and the fact that it is difficult to prevent access to them. In other words, firstly, they are goods that have a physical presence on a global scale, being used in all regions with differing intensities and are fundamental to sustaining human life. Secondly, their use is competitive, because even though they are renewable resources, their intensive use can prevent other actors from using them (Lopes, 2018). Finally, "*it is socially difficult to prevent access to these goods, i.e. they are goods which, although they may be technically and physically appropriate, are actually goods which all human beings need for their survival and which are so widespread on the planet that preventing full access to them is extremely difficult*" (Lopes, 2018, p.329). Finally, it should be noted that they are often referred to as res nullius or res communis, in other words, assets that by their nature belong to

such as water scarcity originate in and affect several states. These problems, which affect several states, are not easily solved by unilateral mechanisms, so their national security interests force them to act collectively". In other words, these are problems which – either because of their causes or their consequences, or simply because of the type of object they concern – go beyond the borders of the nation-state (Barnett, 2010).

Thirdly, the environmental violence approach focuses on the relationship between the environment and violent conflicts. It looks at the dispute over access to resources and challenges the paradox of cooperation versus conflict. This approach will be discussed below when we talk about resource security issues and the issue of conflicts over water resources.

The approach has received a lot of criticism, calling into question the idea of climate change induced conflicts. That is not to say that climate change or environmental issues cannot be associated with conflict dynamics, but rather that they are not, *per se*, direct causes of those dynamics. Rather, and similarly to what we will see below with regard to food security and resource scarcity, climate change can be related to pre-existing factors of instability, such as organized crime, terrorism, guerrilla warfare, wars, endemic poverty, lack of infrastructure, political instability, among others, and can thus contribute to aggravating the pre-existing situation, thus leading to a degeneration of the political scenario and its transformation into a conflict through what has been described as the threat multiplier effect (Simões, 2024a).

The fourth approach, relating to national security, assumes that "*regardless of whether climate change generates violent conflicts or not, it is potentially responsible for jeopardizing national security in more subtle ways*" (Simões, 2024a, p.54; Barnett, 2010). It is in this context that Barnett (2010) considers that climate change can affect the economic support capacity of the armed forces, but also various industrial sectors, such as fishing, agriculture, mining, tourism, among others, which can also be adversely affected by climate change, consequently negatively affecting the state's economic sector. Below we will return to the analysis of the impact of climate change on national security, with a specific focus on territorial integrity.

Fifthly, the approach to the relationship between the armed forces and climate change is, according to Barnett (2010), profoundly contradictory, since the objective of the armed forces (winning wars) is usually contrary to that of environmental movements seeking to promote sustainable development. In fact, as a general rule, wars almost always result in the environmental degradation as the outcome of the conflict scenario, as was seen in Japan with the use of nuclear weapons, in Vietnam with Agent Orange, the destruction of crops in Eritrea or the burning of oil wells in Kuwait (Barnett, 2010; Simões, 2024a).

Moreover, war has several other impacts on the environment, such as the predation of resources to sustain the war effort, when it is often these same natural resources that trigger the conflict (Barnett, 2010).

no one, or that by belonging to the community as a whole cannot be appropriated by any private individual, nor limited by the particular jurisdiction of an actor, since as we have been mentioning here, they are shared by all of humanity and as such constitute its common heritage (Magalhães, 2020; Magalhães et al., 2021).

Finally, with regard to our sixth approach, which is oriented towards human security, it should be noted that in this context the environment becomes a sector of security and not an object to be securitized per se. Thus, environmental security encompasses international security, state security and the security of individuals (Barnett, 2010). Climate change is perceived as a threat to human security, since individuals are exposed to different levels of environmental insecurity, depending on where they live, the intensity of the impacts of climate change on them, their resistance to the damage caused by these changes and the capacity of humans to adapt to these transformations (Barnett, 2010; Simões, 2024a).

It should also be stressed that environmental insecurity does not exist in a vacuum and the threat of climate change to human security must be considered in its interrelationship with other social factors, such as poverty, discrimination, the effectiveness of government decisions, among other aspects (Barnett, 2010; Simões, 2024a).

For practical purposes, this is the latter approach that we have adopted for the discussion of the themes to be developed later in this article. Environmental security must be linked to diverse issues such as protecting biodiversity and guaranteeing civil liability for environmental damage. We therefore consider environmental security to be a vast area that encompasses both conventional and unconventional security dynamics, emphasizing the importance of the environment as the main means of guaranteeing human survival. This includes various other areas of human security, such as food security, water security and energy security.

Thus, to a large extent, environmental security presupposes access in quality and quantity to the most fundamental natural resources for human survival and well-being, and this access must be stable and perpetuated along transgenerational lines and based on a logic of rational consumption of these resources.

3. Climate change and conflict

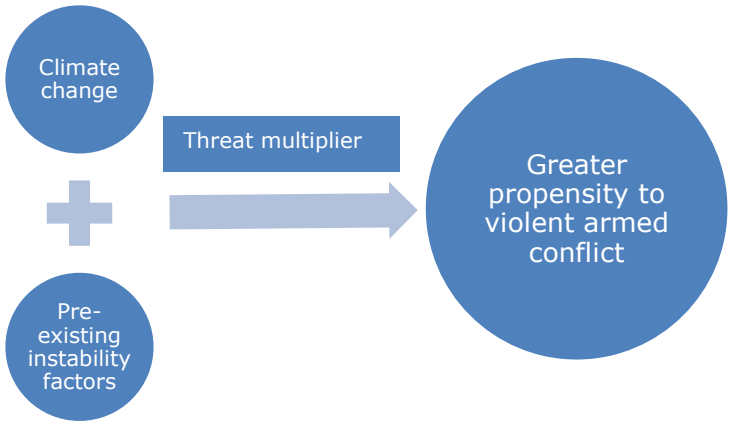
Having given due consideration to environmental security, we will now try to analyze the possible relationship between conflicts and climate change, so we believe it is justified to first identify the concept of conflict. In this sense, we have adopted the conceptual proposal we have already elaborated in other work, thus "*a conflict will be a rational (and therefore human), intentional and social confrontation between incompatible individuals who, at a given moment and circumstance, dispute exclusively opposing interests, presupposing the use of coercion, whether violent or not*" (Simões, 2024a, p.32).

Climate change is indeed one of the main security threats of the 21st century. Its various effects, such as global warming, ocean acidification, melting ice caps, rising sea levels, desertification, changes in temperature and precipitation patterns, have the potential to pose existential threats to various states and communities (Simões, 2024a,b).

As Swain (2016) points out, "*environmental stress is one of the main catalysts of social insecurity*" (p.151), so phenomena such as environmental migrations, resource scarcity, environmental disasters, extreme natural events such as major cyclones and tropical storms, in essence phenomena derived from climate change, contribute to accentuating environmental stress and consequently increasing political instability in a given region.

In this sense, there has been much debate about the relationship between climate change and armed conflicts (Swain, 2016). It is therefore a question of determining the extent to which climate change is directly responsible for triggering armed conflicts, whether internal or international. Although climate change can contribute to increasing the propensity for armed conflict, this is not a direct causal relationship, but rather the combined interaction of its effects with pre-existing factors of instability (figure 3).

Figure 3 - Relationship between climate change and pre-existing instability



Source: Own production

As Simões (2024a, p.69) points out,

> *"the argument is not that climate change does not have consequences for social stability, on the contrary, since it immediately leads to an increase in the propensity for marginal collective violence and in developing countries. It's about understanding that despite its consequences, these do not manifest themselves in the majority of cases as key causes for the development of conflicts".*

In other words, the various effects caused by climate change interact with pre-existing factors of instability, such as terrorism and guerrilla warfare, economic instability, great ethnic and religious diversity, scarcity of resources, famine, among other factors. The multi-causal interaction between climate change and the factors identified means that, through what is known as the threat multiplier effect, a situation of instability can worsen due to the multiplication of threats and degenerate into a potential armed conflict (Simões, 2024a; Swain. 2016).

Environmental conflicts, particularly those that occur around natural resources that tend to be scarce, can be classified as vertical when they occur between different levels of governance, for example between the central government and local or municipal authorities, and horizontal conflicts when they occur between competing uses, for example hydro-energy production, grazing, livestock farming, industrial and domestic water supply, land allocation for agricultural practices, or when they occur between state

users and, therefore, here we are referring to conflicts directly between states, or when they occur between non-state users and, therefore, we may be talking about different communities that need the same resource for different purposes.

With regard to this last type of horizontal conflicts, there are several examples of communal conflicts in Africa, in which even if the environment or natural resource is not the direct cause, it may have contributed as a trigger to the conflict. One such case is the tensions between ethnic Fulani Muslim pastoralists in Nigeria and Christian farmers in the same country (Furini, 2019). However, disputes between pastoralist communities and farming communities are a widespread reality throughout Nigeria and, even though we are not going to discuss that here, the solution is, as Furini (2019) points out, difficult to achieve.

These types of conflictual dynamics are not limited to Nigeria. In fact, we find relationships of conflictual tension between farming and pastoral communities all over Africa, for example in Rwanda, Ethiopia, Cameroon and many other states. We also find these kinds of conflictual dynamics in Asia, for example in Nepal, India and Pakistan. In fact, it is important to point out that the possibility of horizontal conflicts over natural resources is not limited to any particular latitude.

3.1 Climate change, traditional threats versus non-traditional

a) Traditional threats

As regards traditional threats, we shall focus here on the interpretation of climate change as a threat to national security. Barnett (2010) considers that whether or not climate change generates violent conflict, it is potentially responsible for undermining national security in more subtle ways. In other words,

> *"climate change can affect the economic support capacity of the armed forces, but also various industrial sectors, such as fishing, agriculture, mining, tourism, among others, which can also be adversely affected by climate change, consequently negatively affecting the state's economic sector"* (Simões, 2024a, p.54).

From our perspective there is therefore a link between the economic sphere and national security, since if the first sphere is ecologically unsustainable, the second could be too. On the other hand, as Barnett (2010) and Simões (2024a, p.54) point out,

> *"climate change can jeopardize national security at other levels, starting with territorial integrity, through an increase in the frequency of phenomena such as hurricanes, jeopardizing the integrity of critical infrastructures, such as those responsible for energy production, and water and food distribution".*

McDonald (2013) states that "*the national security discourse has been consistently advanced by representatives of existing national security institutions and by those attempting to speak to policy-makers*" (p.45). In several states, the national authorities

have accepted the idea that climate change must be seen and must be treated as a threat to national security and territorial integrity, since, in fact, in several cases such as Tuvalu, climate change threatens the continued territorial existence of the state (Simões, 2024a, b).

This type of discourse has also been conveyed by various think tanks, where several personalities point to the threat multiplier effect of climate change (McDonald, 2013; Simões, 2024a). In other words, the idea that the effects of climate change "*are related to pre-existing factors of instability, such as terrorism, endemic poverty, lack of resources, organized crime, among others, and that they exacerbate the conditions of insecurity and instability and could lead to a potential armed conflict*" (Simões, 2024a, p.144).

The responses drawn from this type of discourse lead us to the "*recognition of the need for mitigation strategies, but largely focuses on the ways in which states might adapt to the manifestations of climate change (...) the suggestion here is that militaries and defence establishments should become more aware of potential axes of (climate-induced) conflict*" (McDonald, 2013, p.45), as well as developing strategies better able to protect national interests.

This type of discourse also has the potential not only to fail to address the causes of climate change, but also to define those most affected as potential threats. Firstly, because populations forced to move due to intense and abrupt natural disasters can be seen as a threat to the territorial integrity of another state.

Consequently, we may find ourselves in a situation where instead of guaranteeing the safety of those most vulnerable to the effects of climate change, we end up protecting ourselves from the supposed threat posed by these "others" (Campbell, 2008; Podesta & Ogden, 2007; Schwartz & Randall, 2003). This is a particularly relevant issue when we consider the degree of vulnerability of Small Island Developing States (SIDS) to climate change and the risk of forced displacement faced by some of these communities (Simões, 2024b).

b) Unconventional threats

The following section seeks to summarize the unconventional implications of climate change in the field of security. It is therefore worth highlighting its impacts on resource security, food security, health security and the security of migratory flows.

In this sense, and starting with resource security, it is worth beginning by understanding what is meant by natural resources. On this issue, Gomes and Leong (2023) state that "taking into account that the environment is a natural substrate for human use, it is common to alternate or synonymize the concepts environmental good and natural resource" (p.49), however there are differences that need to be demystified. An environmental asset is any element of nature, while a natural resource is any natural asset with economic value (Gomes & Leong, 2023).

There are many natural resources that can generate insecurity and disputes, but we will only look at two of them. Firstly, and in this section, oil and, secondly and later on, water resources.

Oil is first and foremost a non-renewable resource, which means that its availability on planet Earth is limited. Oil has also been one of the great engines of industrialization and development for the major global powers, a factor that gives it particular relevance in the race for global hegemony. Hydrocarbon reserves are essentially concentrated in geopolitically sensitive areas such as the Middle East, Central Asia and the Caspian region. In addition,

> *"the risk of a conflict based on the oil factor is very real, all the more so because the strong dependence of industrial countries, which are major consumers of oil - from which they have made their main source of energy - makes them vulnerable. In fact, they are exposed to the risk of a suspension of supplies, with oil then being used as a weapon by the producing countries"* (Boniface, 2003, p.86).

This is undoubtedly one way of looking at the importance of resource security, but both the abundance of resources and the scarcity of resources, for different reasons, are likely to generate conflicts and instability. In the case of oil, not a few conflicts have developed between both oil-producing parties, nor are there few conflicts that have taken place within a state in order to guarantee control of the oil by a particular group.

With regard to the implications for food security, it is worth considering the conceptual proposal developed by the FAO, according to which food security is made up of six pillars (FAO, 2009; FAO et al., 2021; HLPE, 2020): (i) availability; (ii) access; (iii) utilization; (iv) stability; (v) agency; (vi) sustainability.[3]

When stressing availability we mean the existence of food at the level of production, distribution and trade. It is important to note that food availability is only one of the three

[3] With regard to food security, there is also a need for a brief note on transgenic or genetically modified organisms. In 1994, the first genetically modified food was introduced to the US market - the Flavr Savr tomato - which turned out to be a commercial fiasco and was withdrawn from the market in 1997 (Silva, 2018). Despite the initial failures in the commercialization of transgenic organisms, today the cultivation area of these products already reaches around 180 million hectares, of which more than 90% is divided between the USA, Brazil, Argentina, India, Canada and China (Silva, 2018). According to the same author, transgenic organisms, " more than a planned commitment to plant improvement, they represent a fortuitous agronomic evolution" (Silva, 2018, p.224). There is no doubt that genetically modified organisms can and do have an impact on food safety. According to Qaim and Kouser (2013), genetically modified organisms can fundamentally affect food security in three ways: firstly, they can contribute to increased food production and thus increase the availability of food locally, regionally and globally. Secondly, they can affect the very safety and quality of agricultural crops, since "*crops with new traits can be associated with food safety risks, which have to be assessed and managed case by case*" (Qaim & Kouser, 2013, p.1), and thirdly, genetically modified crops can have economic and social impacts among farming communities, particularly with regard to small farmers, since these genetically modified crops can influence the ease of access to food for farmers themselves.
In addition, genetically modified organisms can be an important tool for safeguarding food security at a global level, but particularly in developing countries. This is primarily because it is possible to genetically modify food products to make them more resistant, for example, to certain extreme climates, such as dry, hot or saline climates. Likewise, the use of genetically modified organisms also makes it possible to increase the nutritional value of food, as is the case with golden rice, a product modified to provide high amounts of vitamin A (Barrell & French, 2024). On the other hand, as we have mentioned, the risks of using genetic engineering in food must be assessed on a case-by-case basis, so even though its risks are not yet fully understood, it should be noted that the use of this type of technology can have negative impacts on the health of individuals, which are still being studied. Furthermore, it can have negative impacts on the ecosystem, through the contamination of "wild" plants and their progressive replacement by modified plants, leading to a potential loss of biodiversity (Barrell & French, 2024). Consequently, although genetically modified organisms can contribute significantly to mitigating the risk of food insecurity, we must not ignore their potential risks to both human health and the security of natural ecosystems.

general components of food systems, the other two being access and utilization (Gregory et al., 2005). Access refers to the allocation of food and the ability of individuals to afford it. Utilization refers in practical terms to the consumption of food and the metabolism of individuals, i.e. in order to achieve food security, the food consumed must be sufficient to meet the physiological needs of each individual (Gregory et al., 2005). In addition, as Loring and Gerlach (2009) point out, the health of individuals also affects the utilization of food, since it is their health that controls how food is metabolized, so the presence of intestinal parasites, for example, can hinder the maximization of the utilization of nutrients from the food consumed.

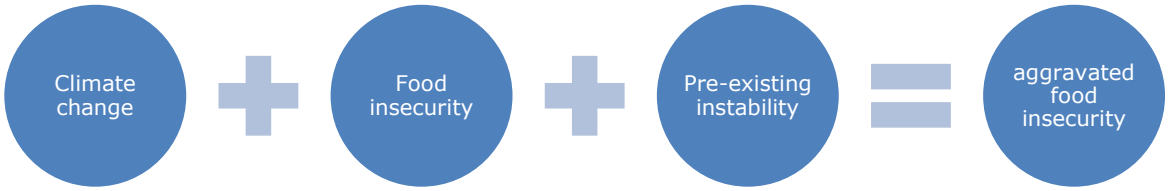
Insofar as stability is concerned, it relates to the possibility of obtaining food continuously over time. It should be noted here that food insecurity does not necessarily have to be a perpetual reality, in fact it rarely is, and can manifest itself in a seasonal, transitory or chronic way. In this sense, there are various factors that affect and determine the duration of food insecurity, from natural disasters, instability in the markets, unemployment and conflicts to factors such as fluctuating production patterns according to the seasons.

The last two pillars, agency and sustainability, relate respectively to the ability of consumers to choose of their own accord the food products they want to consume, produce and distribute in food production systems and, in the case of sustainability, the ability of a food system to provide for food needs in a safe and nutritious way in the long term and without jeopardizing the economy, social structures and natural resources that must guarantee food security for future generations (HLPE, 2020).

From these pillars, we can conclude that food safety is "*a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life*" (FAO et al., 2018). Climate change strongly threatens food security in that it jeopardizes food systems, including crops, livestock and aquaculture, but also the food distribution system itself (O'Neill et al., 2022; Mirzabaev et al., 2023).

How does climate change affect food security? The answer unfolds into various processes and phenomena exacerbated and accelerated by climate change, such as global warming, droughts, floods, changes in rainfall patterns, the occurrence of more extreme and more intense events, among other phenomena. In addition, these processes interact with pre-existing conditions of insecurity (figure 4), such as poverty, scarcity or difficulty in accessing nutritious food, social discrimination, war, among many other conditions (O'Neill et al., 2022).

Figure 4 - Relationship between climate change and pre-existing instability



Source: Own production

Climate change, in addition to potentially impacting the global food production system, has more direct and "tangible" implications when we talk about the number of people at risk of hunger, and the number of people at risk of malnutrition (Mirzabaev et al., 2023).

With regard to concrete figures, as of 2021, 720 to 811 million people were malnourished, while around 2.3 billion people were undernourished (FAO et al., 2021). According to the Integrated Food Security Phase Classification, around 200,000 people are in a level of catastrophic food insecurity, while 32.3 million people are in a level of food security emergency, 112.3 million people are in a level of food insecurity crisis and 210 million people are in a level of food stress (The Integrated Food Security Phase Classification (IPC), 2022).

In addition, "*certain areas of recurrent food insecurity correspond to regions where conflicts persist. In Angola, Ethiopia, Mozambique, Uganda, Sudan and Chad, for example, drought-induced falls in production have been notoriously exacerbated by hostilities*" (Boniface, 2003, p.81). Similarly, situations of long-lasting malnutrition, which are likely to worsen, often precede ruptures in the limits of society's elasticity, thus leading to internal or transnational tensions, as was the case in Rwanda before the 1990 crisis or in Uganda before 1979 (Boniface, 2003).

This elastic limit refers to the limit of stress that may be applied to a material before it stops behaving elastically and becomes permanently deformed. In the case of human communities, this limit can be reached in a variety of ways, resulting in a breakdown of tolerance in the face of a diverse set of undesirable conditions that are unfavorable to human well-being, such as economic instability, political insecurity, persecution and lack of freedoms, food insecurity, among many other conditions.

With regard to health security, it should be noted that this is a concept that refers to activities and measures to mitigate threats to public health and ensure the health of populations (Durbak & Strauss, 2005; WHO, n.d.). According to Morrison and Bliss (2025), "*climate crisis is increasingly recognized to be a health crisis. It is a crisis marked by higher mortality, costly illnesses, and increased risks of new biological pathogens*", the same authors also point out that "*the most visible climate-related factors endangering health are dangerous forms of heat, along with wildfires and smoke, as well*

as ferocious storms and floods" (Morrison & Bliss, 2025), other phenomena, such as the rise in the average level of sea water, affect health systems, supply chains and the provision of health services.

In this sense, we have identified a first class of risks in the climate-health link, which can be called structural risks, insofar as physical structures, from supply chains to the structures themselves, are affected by climate change.

A second class of risks may be called biological, in that, "*toxic brew is giving rise to formidable—and difficult to predict—biological threats that spill over from the animal world to affect human health. It is influencing the seasonal transmission of vector-borne diseases, such as dengue, and shifting the geographic range in which malaria is reported, as well*" (Morrison & Bliss, 2025).

In this context, it is also worth talking about the impact of heat on the health security of populations. Thus, according to Vicedo-Cabrera (2022, p.137), "*climate change is responsible for one in three heat-related deaths - accounting for 37% of heat-related deaths between 1991 and 2018".* The same author also states that *"given that this substantial increase in mortality is occurring with a warming of 0.5 to 1ºC, it is realistic to expect it to increase in the coming decades as warming progresses to levels above 2, 3 or even 4ºC*" (Vicedo-Cabrera, 2022, p.137).

As an example of the impact of climate change on health, we can easily see it in the case of Bangladesh, India and quite a few other Asian states. Particularly in the case of South Asia, due to the melting of glaciers on the Tibetan Plateau and the contamination of this water, "*the access to freshwater, which is already a challenge in parts of Bangladesh, will become even more difficult, spreading the occurrence of health problems related to the lack of drinkable water and for sanitation purposes*" (Ashrafuzzaman & Furini, 2019, p.408).

Finally, with regard to the security of migratory flows, it should be noted that unlike the concept of refugees in its traditional form, there is no agreed normative concept to characterize climate refugees. The UNHCR, for example, instead of using the term climate refugee, uses the term displaced persons in the context of disasters or climate change, considering this term to be more accurate than climate refugees (USA for UNHCR, 2024).

By mid-2024, 90 million of the current 123 million forcibly displaced people lived in states with a high exposure to climate-related risks. This represents an increase of 5 million people living in extremely sensitive and vulnerable regions compared to 2023 (USA for UNHCR, 2024).

Many of the refugee or forcibly displaced communities are located in, or originate from, climatically vulnerable regions, and are particularly susceptible to the effects of climate change and natural disasters (USA for UNHCR, 2024). In addition, the effects of climate change and natural disasters can give rise to conflictual dynamics between displaced communities and host communities, to the extent that in a scenario of resource scarcity, it is not unlikely that there may emerge dynamics of competition for control and access to those same resources.

In addition, according to data from USA for UNHCR (2024), "*the number of countries projected to face extreme climate-related hazards is expected to rise from 3 to 65,*

including many refugee-hosting countries like Cameroon, Chad, South Sudan, Nigeria, Brazil, India and Iraq. Together, these 65 countries host more than 40 percent of all people currently living in displacement, while half of the countries experience fragility".

The term climate refugee was introduced into the academic debate by Lester Brown in 1976, when he defined them as individuals who are forced to leave their homes due to changes in the environment around them, jeopardizing their well-being and livelihoods (Brown et al., 1976). Meanwhile, El-Hinnawi (1985) defines environmental refugees as "*environmental refugees are defined as those people who have been forced to leave their traditional habitat, temporarily or permanently, because of a marked environmental disruption (natural and/or triggered by people) that jeopardized their existence and/or seriously affected the quality of their life*" (p.4).

The same author also considers that we can refer to three categories of climate refugees: firstly, those who have been forced to move temporarily and, when the disruptive environmental phenomenon is over and the affected area is rehabilitated, they will be able to return to their place of origin (El-Hinnawi, 1985).[4] Secondly, it refers to those who have to be permanently relocated to a new place of residence, being displaced due to irreversible changes in the environment of their place of origin.[5] Thirdly, people who move, temporarily or permanently, within the territory of their state, or between states, in search of better living conditions. In this type of flow, the motivation is related to economic well-being, since it is assumed that the natural resources of the territory of origin have been so heavily exploited or depleted that they are no longer able to meet the basic needs of individuals (El-Hinnawi, 1985).[6]

Each of these types of refugees is associated with the creation of new socio-economic, political, cultural and even environmental problems, since human displacement in large groups has an impact on the surrounding environment. In practical terms, climate migration is a subtype of forced mobility, caused by natural disasters, both sudden and gradual, by the occurrence of extreme events, or by anthropogenic pressure factors. In addition, climate-induced displacement can interact with various other forms of insecurity, such as food insecurity, scarcity of resources or loss of territory to the environment.

As Boniface (2003, p.75) points out, "*the development of crisis hotspots and inequalities suggest that these flows (internal or international migration) could increase substantially*".

In addition, climate-induced displacement does not necessarily have to be international, which is why it is often referred to not as refugees, but as climate migrants. The International Organization for Migration has defined climate migrants as "*persons or groups of persons who, predominantly for reasons of sudden or progressive change in the environment that adversely affects their lives or living conditions, are obliged to leave*

[4] We can consider here the cases of populations forced to relocate due to earthquakes, cyclones or even industrial accidents with disruptive environmental impacts.
[5] The construction of dams, the drying up of lakes or the rerouting of rivers can lead to the permanent forced displacement of certain populations.
[6] Small producers and farmers who have their land flooded or contaminated by saline water or other contaminants often don't have the financial capacity to restore their properties, so they end up abandoning them and moving to other urban centers in search of new jobs.

their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad" (IOM, 2007, p.33).

This is an admittedly vague and flexible conceptual proposal, which makes it possible to include a diverse set of population movements motivated by different environmental events – thus encompassing forced or voluntary, temporary or permanent, internal or transnational, individual or group and short or long-distance displacements.

It should also be noted that the nature of the displacement depends not only on the type of climatic event, i.e. whether it is a gradual event such as desertification or a rise in the average sea level or a sudden event such as floods and cyclones, but also, and perhaps mainly, on the interaction of these events with the socio-economic, cultural and political environment of a given population.

4. Climate change and conflicts over water resources

One of the main challenges concerns international agreements for sharing freshwater resources, since the water present in international river basins will also inevitably be affected by climate change, varying to a greater or lesser extent from region to region (Swain, 2016).

According to Simões (2025)

> *"rivers are important sources of various types of power, contributing to human interconnectivity and playing an important role in the circulation of economic goods. Likewise, rivers contribute to the production and maintenance of the energy sector, particularly the hydro-energy sector. On the other hand, rivers are responsible for the transportation of important natural resources, they contribute to the maintenance of various ecosystems and, perhaps most importantly, they play an important role in maintaining human life, starting with the use of their waters for irrigating agricultural fields and direct consumption"* (pp. 57-58).

The same author points out that: "*water conflicts in transboundary river basins are natural relations of predatory dispute over natural resources. In many cases, these relationships are seen as zero-sum games, in that the interests of the upstream state or states are often at odds with the interests of the downstream state or states*" (Simões, 2025, p.61), and adds that "*this does not mean, however, that relations between riparian states are strictly conflictual. Rather, it is a conjunctural issue, often determined or at least influenced by internal factors on each side, as well as the historical relationship between the parties. Other factors, such as external intervention by other powers, which aim to create spheres of influence in the same region, often contribute to determining the course of regional relations, as the different spheres of influence in the same region often compete with each other*" (Simões, 2025 p.62).

In short, the parties involved in the management of an international river basin can choose to diverge in their actions and consequently enter into a relationship of competition for control of the resources, or they can choose to converge and enter into

a relationship of cooperation (Lopes, 2009, 2010; Simões, 2025; Swathi, 2020). It is in this sense that water, in its dynamics as a shared resource, can either be a factor in promoting conflict or cooperative dynamics (Lopes, 2009, 2010).

Indeed, several international river basins have seen a proliferation of agreements regulating the use of their water resources, as well as the creation of specific organizations to manage their resources, such as the Mekong River Commission, the International Commission for the Protection of the Rhine, the Senegal River Development Commission, among others.

Furthermore, according to Baranyai (2020, p.18),

> *"within the first generation of hydropolitical studies two distinct schools of thought emerged: one concentrating on the potential of conflicts triggered by competition for water and one focusing on the cooperation imperative over transboundary water resources (…) More recently, a new wave of research has emerged with a view to overcoming the conflict and cooperation divide. Scholars of this branch recognise the inherent complexity of water relations, underlining that conflict and cooperation are not necessarily contradictory, but can occur simultaneously".*

There are also several other arguments used to explain why wars over water resources tend not to occur, which is not the same as saying that diplomatic disputes do not occur, because these are a constant reality in the field of international hydro-politics (Simões, 2024a).

The same author lists the following arguments: (i) historical; (ii) strategic; (iii) shared interests; (iv) durability of institutions; (v) economic interests; (vi) virtual water; (vii) naivety; (viii) hydro-hegemony. The historical argument reflects the scarcity of recent conflicts motivated directly by water factors, and those that have occurred have mainly been local conflicts between tribes, certain sectors of the population or, in some cases, states directly dependent on these resources (Simões, 2024a). As far as strategic arguments are concerned, the same author states that "*despite the pressing possibility of conflict between countries with a greater strategic advantage and countries with a lesser strategic advantage*" (Simões, 2024a, p.76), states tend to opt for avenues of cooperation in order to best achieve their strategic goals.

In the same sense, shared interests, materialized in bilateral or multilateral treaties, show that sharing and cooperation around water resources can be the most beneficial scenario. The same author points out, with regard to the role of institutions, that "*the construction of institutions dedicated to the management of water resources can be a factor in countering the argument of water wars, especially when it comes to stable organizations with a high degree of durability*" (Simões, 2024a, p.76), and adds that their treaties "*with a greater or lesser degree of flexibility to adapt to the circumstances of each period, contribute to a stable and lasting water regime*" (Simões, 2024a, p.76).

With regard to economic interests, this is the idea that the costs necessary to carry out a water war do not justify the possible gains. As far as virtual water is concerned, this argument

> *"explains why water wars do not exist, since virtual water is an alternative source of water, as well as a strategic asset in preventing disputes arising from water scarcity contexts (...) it explains how the countries most affected by water scarcity, or deficits, can reduce this relative lack of water resources by obtaining them virtually through the import of agricultural products (...) However, virtual water is not a miracle solution. Firstly, because not only are agricultural markets not perfect, being subject to quality standards, barriers and customs tariffs, but prices on world markets fluctuate, or the abandonment of production of certain crops puts national sovereignty at risk in a scenario of global scarcity"* (Simões, 2024a, p.77).

With regard to the argument of social ingenuity, the same author states that "*this assumes that water wars have been scarce precisely because, due to so-called social ingenuity, communities develop new adaptive strategies, for example, by creating technical, economic and social instruments, as well as by adopting new ideas that make it possible to adapt to a circumstance of environmental scarcity*" (Simões, 2024a, p.77).

Finally, with regard to the hydro-hegemony argument, Zeitoun and Warner (2006) consider that, to a large extent, the fundamental factor for water wars not to occur is the existence of a hydro-hegemonic power in a given transnational basin, as is the case, for example, with China on the Mekong River or Egypt on the Nile River. In addition, they point out that hegemonic power produces a regional order and, precisely because of the hegemonic status, it is unlikely that the other states in the basin will challenge this order (Simões, 2024a; Zeitoun & Warner, 2006).

An important region to consider when talking about hydro-political conflicts is Asia, in particular the Tibetan Plateau. Glacial melting will have very significant impacts on Asia's main river basins, such as the Ganges River, the Mekong River, the Salween River, the Irrawady River, the Brahmaputra River, among other rivers that originate on the Tibetan Plateau and contribute to the water supply of around 50% of the world's population distributed across China, Nepal, Bhutan, Pakistan, Bangladesh, Thailand, Myanmar, Laos, Cambodia and Vietnam (Chellaney, 2013; Leal, 2019; Simões, 2024a; Swain, 2016).

In addition, water resources are a source of political tension between China and India, India and Pakistan, and China with most of the Southeast Asian mainland. Since both China and India need to supply their growing metropolitan areas, characterized by a growing middle class and new water needs. Likewise, the need to capture water resources also serves to promote China's economic growth, being important for both agricultural production and the production of hydropower (Chellaney, 2013; Leal, 2019; Simões, 2024a; Zeitoun et al., 2020).

In other latitudes, desertification, scarcity of water resources, and changes in rainfall patterns have become a growing security concern in various riverine regions such as the Jordan River basins, the Aral Sea basin, the African Great Lakes basins, the Zambezi basin and the Nile basin, among other river basins.

5. Final thoughts on climate change, political instability and security

Climate change affects international security in many various ways and forms, so it not only draws implications for State security in the traditional security approach, but it also has profound and diverse implications for human security.

This study has explored the intricate nexus between climate change, water, food, and health security, demonstrating how these elements are deeply interwoven with political stability and security. While climate change is not a direct cause of violent conflicts, its effects act as a **threat multiplier**, exacerbating pre-existing socio-political vulnerabilities. Water scarcity, food insecurity, and deteriorating public health systems create conditions that heighten instability, particularly in regions already facing economic and political fragility.

Furthermore, it is relevant to note that the interconnectedness of **water, food, health, and climate change** forms a critical nexus that directly impacts not only **human security, but political stability, and sustainable development**. Hence, climate change exacerbates existing vulnerabilities in all these sectors, intensifying **resource scarcity, economic disparities, and socio-political tensions**.

The way in which climate change affects regional stability and the various states depends on their capacity for resilience and adaptation versus their degree of vulnerability.

In many cases, the capacity for resilience and adaptation depends not only on the geographical position of the state (for example, whether it is continental or insular), the possession of natural resources and the ease of access to these resources, but perhaps fundamentally on its degree of development. Therefore, factors such as endemic poverty, low levels of literacy, fragile institutions and weak governance, infrastructural deficits, resource scarcity, hunger, great ethnic and religious diversity, traumas related to armed conflicts and guerrilla warfare, limited access to health care, among many other factors, contribute to a decrease in the capacity to mitigate and adapt to climate change, inversely increasing the likelihood of conflicts occurring.

Migratory flows also contribute to increased political instability, not only because there are environmental push factors in the states of departure, but also because these migratory flows also have an impact on the states of arrival.

Lastly, it should also be noted that, despite various international efforts, whether through a wide range of international conventions and treaties that have been approved since the late 1960s or through the COPs (Summits of the Parties), the international environmental agenda has actually entered a phase of stagnation, deeply characterized by the North-South dichotomy. In fact, despite successive diplomatic efforts, almost everything remains to be done.

Addressing these challenges requires **a paradigm shift in security policy**, one that **prioritizes resilience-building, transnational cooperation, and sustainable resource management**. Traditional security frameworks must evolve to incorporate **environmental and human security concerns**, recognizing that instability cannot be mitigated through military measures alone. While international agreements and climate policies have made some progress, their effectiveness is often hindered by geopolitical rivalries and economic disparities.

Thus, it is our understanding that, ultimately, without decisive action, climate change will **continue to amplify instability**, compounding humanitarian crises, economic disruptions, and political fragmentation. Ensuring global security in the 21st century will depend not only on how states address traditional military threats but also on their ability to confront **the destabilizing forces of environmental change.**

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